

USDA's Food Guide: Updating the Research Base to Reflect Changes in Food Consumption Patterns

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The Food Guide Pyramid was based on a food guide developed in the early 1980's by the U.S. Department of Agriculture (USDA). This food guide was developed to meet specific nutritional goals and was based on food consumption patterns of Americans (1,3) and food composition data. While the original food guide used the 1980 Recommended Dietary Allowances (RDA) to set nutritional goals for food energy, protein, vitamins, and minerals, the 1980 edition of the *Dietary Guidelines for Americans* was used to provide nutritional goals for fat and added sugars. The 1989 RDA and the 1985 and 1990 editions of the *Dietary Guidelines for Americans* were used in subsequent research that described the food guide (4).

In developing the food guide, the USDA used food intakes from the Nationwide Food Consumption Survey (NFCS 1977-78, Spring 1977) for all individuals to identify patterns of actual intake within food groups and subgroups (3). These food-group and subgroup "composites" are important parts of the research base supporting the food guide. For each food group or subgroup, USDA developed a composite that reflected, on a percentage basis, Americans' use of individual foods within that group. For example, in 1977 the deep-yellow vegetable composite was 79.5 percent carrots, 10.6 percent sweet potatoes, and 10.0 percent winter squash. Composites were developed for each of the following food groups or

subgroups: Meat, poultry, fish; dark-green leafy vegetable; deep-yellow vegetable; starchy vegetable; legume; other vegetable; fruit; whole grains; and enriched grains. These composites were used to provide documentation that the recommended food-selection patterns, in terms of numbers of servings for each food group and subgroup, would meet nutritional goals.

Nutrient profiles for each composite were calculated by using the forms of the food items that were lowest in fat and added sugars. This reflected the philosophical goals that the food guide be realistic and allow maximum flexibility for users to select specific sources of fats and sugars within their diet.

The objective of the research described here was to determine whether the diet pattern of the Food Guide Pyramid continues to meet nutritional goals. Effects of changes in Americans' food selections between 1977 and 1991 on the nutrient profiles of food group composites were assessed.

Procedures for Updating the Composites

The NFCS 1977-78 composites for each food group and subgroup were updated by using data from the Continuing Survey of Food Intakes by Individuals (CSFII) 1989-91. Foods

reported in the CSFII 1989-91 as consumed by 11,488 individuals 2 years old and older were used, and sample weights were applied to provide estimates that were representative of the population. USDA's Center for Nutrition Policy and Promotion developed a Food Guide Servings Data Base that was used to convert grams of foods reported as consumed in the CSFII 1989-91 into numbers of food guide servings.

Composites for each Pyramid food group (e.g., meat, poultry, fish) or subgroup (e.g., dark-green leafy vegetable) were developed based on consumption of food items (e.g., cooked broccoli) as reported in the CSFII 1989-91. For example, all food codes that were consumed and that contained cooked broccoli were grouped together in a "cooked broccoli item group." A composite was then constructed of these item groups and weighted by the number of servings of each that were reported by all individuals. One food code was selected to represent each food-item group in each of the composites, and nutrient values of these food codes were used to calculate the nutrient profile of a composite serving.

The original composites, developed by using NFCS 1977-78 data, were then compared with the updated composites. Both the percentages of each food-item group in the composites and the nutrient profiles of the composites were compared. Nutrient data from 1991 were used for the calculation of both the original and updated composites' nutrient profiles. The nutrient values per serving of each food group or subgroup for the original composites (4) and the updated composites (2) have been published.

To determine whether the food guide patterns based on updated composites

continued to meet nutritional goals, the Food Guide Pyramid diet pattern for 1,600 calories was calculated and nutrient totals were then compared with the current nutritional goals for the food guide, including the 1989 RDA. Results were also compared with the 1,600-calorie pattern based on the 1977-78 composites to examine trends over time.

Results

Changes occurred between 1977 and 1991 in the percentages of specific food items consumed within the food groups and subgroups, thus altering the nutrient profiles of several composites. The amounts of zinc, vitamin B₁₂, and iron in the meat, poultry, fish composite decreased due to the smaller amounts of beef and liver consumed in 1991 (44 percent) compared with 1977 (52 percent) (fig. 1). The amount of zinc dropped from 1.27 to 1.10 mg per ounce; vitamin B₁₂, from 1.4 to 0.6 mcg per ounce; and iron, from 0.62 to 0.54 mg per ounce.

As a nutrient in the dark-green leafy vegetable composite, vitamin A dropped from 363 to 238 RE per serving primarily due to less spinach being consumed in 1991 (fig. 2). In 1977 spinach was about 29 percent of the dark-green leafy vegetable composite, compared with about 14 percent in 1991. Cooked spinach is a much richer source (819 RE per 100 g) of vitamin A than cooked broccoli (139 RE). The increase in the amount of broccoli consumed, from 32 to about 58 percent between 1977 and 1991, resulted in a sharp increase in vitamin C: from 24 to 43 mg per serving of the dark-green leafy vegetable composite. A decrease in the amount of folate per serving (76 to 56 mcg) was also attributable to the decreased consumption of spinach—the most concentrated

source of folate among the food items in this composite.

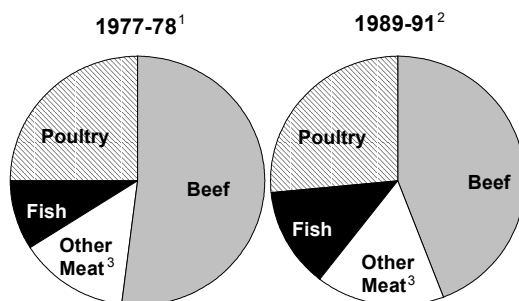
Between 1977 and 1991 the percentage of foods in the legume composite changed dramatically (fig. 3). While white beans decreased from about 53 to 27 percent of the composite, pinto beans increased from about 22 to about 32 percent. The changes in the amounts of the various components of the legume composite resulted, however, in only slight changes in the nutrient profile of this composite. For example, dietary fiber per serving increased slightly, from 5.3 to 5.7 g.

Dietary fiber in the fruit composite dropped to 1.2 g per serving (from 1.6 g) due to the slight increase (5 percent) in consumption of "other juice" (noncitrus juice) between 1977 and 1991. The other nutrients in a serving of the fruit composite varied only slightly between the original and updated composites. Vitamin C, for example, changed by only 2 mg per serving: from 32 to 30.

The dietary fiber content of the composite for whole grains rose from 1.8 to 2.0 g per serving, mainly from the increased consumption of "other whole grains": primarily corn tortillas and popcorn. From 1977 to 1991 "other whole grains" changed from about 14 to about 21 percent of the whole grains composite. Corn tortillas and popcorn also contributed to an increased amount of magnesium in the composite in 1991, a rise from 20.6 to 23.0 mg per serving.

The 1991 composites' nutrient profiles were used to calculate the 1,600-calorie Food Guide Pyramid diet pattern. The pattern met nutritional goals for food energy, protein, vitamins, most minerals, dietary fiber, sodium, fat, and added sugars. As in 1977-78, iron, zinc, and copper were between 70 and 88 percent of the 1989 RDA for

Figure 1. Comparison of meat, poultry, fish group composites

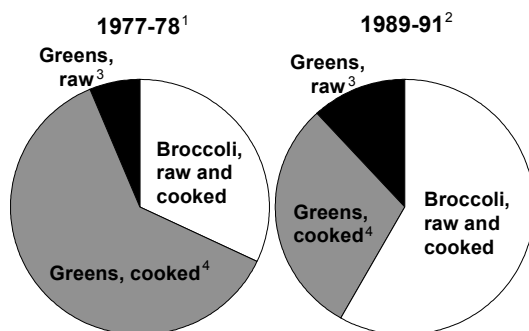


¹Nationwide Food Consumption Survey

²Continuing Survey of Foods Intakes by Individuals, 3-day, weighted data for all individuals 2 years old and older.

³Includes pork and lamb.

Figure 2. Comparison of dark-green leafy vegetable subgroup composites



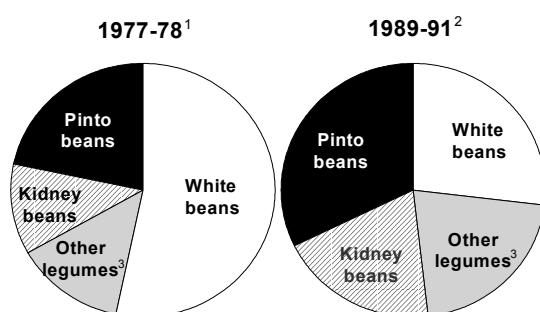
¹Nationwide Food Consumption Survey

²Continuing Survey of Foods Intakes by Individuals, 3-day, weighted data for all individuals 2 years old and older.

³Includes romaine, spinach, endive, etc.

⁴Includes spinach, kale, collards, etc.

Figure 3. Comparison of legume subgroup composites



¹Nationwide Food Consumption Survey

²Continuing Survey of Foods Intakes by Individuals, 3-day, weighted data for all individuals 2 years old and older.

³Includes lentils, chickpeas, split peas, etc.

women. From the 1977 to the 1991 composites, little change occurred in the overall nutrient adequacy of the diet pattern. Nonfortified ready-to-eat and cooked breakfast cereals were used in both the 1977-78 and 1989-91 composites for whole grains and enriched grains. Composite nutrient profiles thus do not over-count the nutrients from fortified breakfast cereals for people who do not eat them. This was consistent with the philosophical goals for the food guide. Actual intakes of nutrients commonly used in fortified cereals may be higher than the levels reflected in analysis of the Food Guide Pyramid diet pattern.

Conclusions

USDA's Food Guide Pyramid depicts patterns of food selection that provide adequate amounts of food energy, protein, vitamins, minerals, and dietary fiber for good health and that are moderate in sodium, added sugars, and fat. Regardless of changes in individual food group composites over time, Pyramid dietary patterns continue to meet most nutrient objectives. Women's consumption of important food sources of iron, copper, and zinc, which fell below the RDA, should be encouraged. Continued monitoring with new data on food consumption is recommended. Procedures for updating composites based on current consumption data have been automated and thus permit continued research related to food guidance.

References

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